Ordering number : ENA1769

SANYO Semiconductors

DATA SHEET

An ON Semiconductor Company

N-Channel Silicon MOSFET

WPB4002 — General-Purpose Switching Device Applications

Features

- Reverse recovery time t_{rr}=115ns (typ)
- Input capacitance Ciss=2200pF (typ)
- ON-resistance $R_{DS}(on)$=0.28Ω (typ)
- 10V drive

Specifications

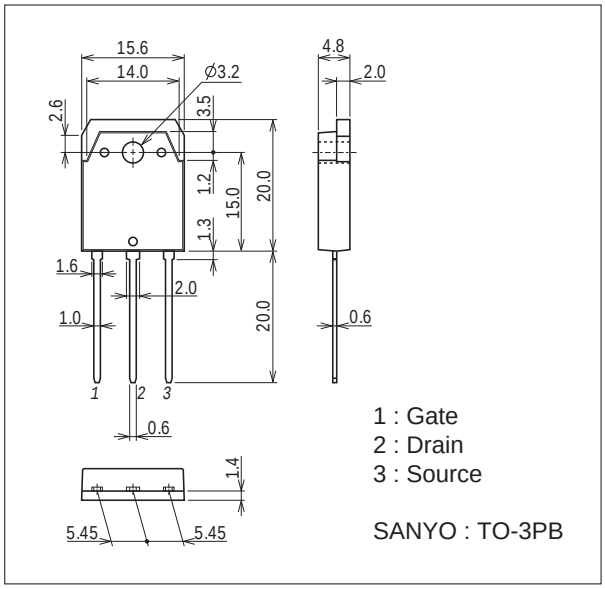
Absolute Maximum Ratings at Ta=25°C

Parameter	Symbol	Conditions	Ratings	Unit
Drain-to-Source Voltage	V_{DSS}		600	V
Gate-to-Source Voltage	V_{GSS}		±30	V
Drain Current (DC)	I_D		23	A
Drain Current (Pulse)	I_{DP}	PW≤10μs, duty cycle≤1%	80	A
Source-to-Drain Diode Forward Current (DC)	I_{SD}		23	A
Source-to-Drain Diode Forward Current (Pulse)	I_{SDP}	PW≤10μs, duty cycle≤1%	80	A
Allowable Power Dissipation	P_D		2.5	W
		Tc=25°C	220	W
Channel Temperature	Tch		150	°C
Storage Temperature	Tstg		−55 to +150	°C
Avalanche Energy (Single Pulse) *1	E_{AS}		172	mJ
Avalanche Current *2	I_{AV}		17	A

Note :*1 V_{DD}=99V, L=1mH, I_{AV}=17A (Fig.1)
*2 L≤1mH, single pulse

Package Dimensions

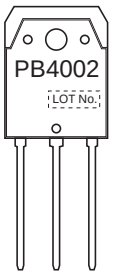
unit : mm (typ)
7503-004



Product & Package Information

- Package : TO-3PB
- JEITA, JEDEC : SC-65, TO-247, SOT199
- Minimum Packing Quantity : 100 pcs. / tray

Marking



Electrical Characteristics at Ta=25°C

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Drain-to-Source Breakdown Voltage	$V_{(BR)DSS}$	I_D=10mA, V_{GS}=0V	600			V
Zero-Gate Voltage Drain Current	I_{DSS}	V_{DS}=480V, V_{GS}=0V			100	μA
Gate-to-Source Leakage Current	I_{GSS}	V_{GS}=±30V, V_{DS}=0V			±100	nA
Cutoff Voltage	V_{GS}(off)	V_{DS}=10V, I_D=1mA	3		5	V
Forward Transfer Admittance	| yfs |	V_{DS}=10V, I_D=11.5A	7.5	15		S
Static Drain-to-Source On-State Resistance	R_{DS}(on)	I_D=11.5A, V_{GS}=10V		0.28	0.36	Ω
Input Capacitance	Ciss	V_{DS}=30V, f=1MHz		2200		pF
Output Capacitance	Coss	V_{DS}=30V, f=1MHz		400		pF
Reverse Transfer Capacitance	Crss	V_{DS}=30V, f=1MHz		83		pF
Turn-ON Delay Time	t_d(on)	See Fig.2		42		ns
Rise Time	t_r	See Fig.2		130		ns
Turn-OFF Delay Time	t_d(off)	See Fig.2		234		ns
Fall Time	t_f	See Fig.2		84		ns
Total Gate Charge	Qg	V_{DS}=200V, V_{GS}=10V, I_D=23A		84		nC
Gate-to-Source Charge	Qgs	V_{DS}=200V, V_{GS}=10V, I_D=23A		15.2		nC
Gate-to-Drain “Miller” Charge	Qgd	V_{DS}=200V, V_{GS}=10V, I_D=23A		45.4		nC
Diode Forward Voltage	V_{SD}	I_S=23A, V_{GS}=0V		1.1	1.5	V
Reverse Recovery Time	t_{rr}	See Fig.3		115		ns
Reverse Recovery Charge	Q_{rr}	I_{SD}=23A, V_{GS}=0V, di/dt=100A/μs		340		nC

Fig.1 Avalanche Resistance Test Circuit

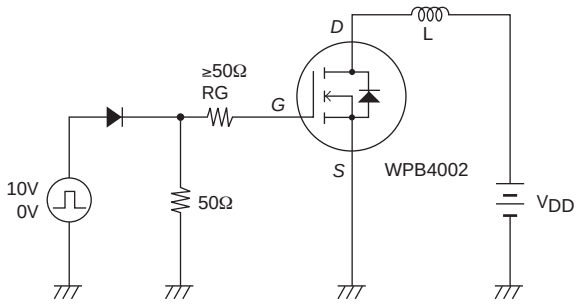


Fig.2 Switching Time Test Circuit

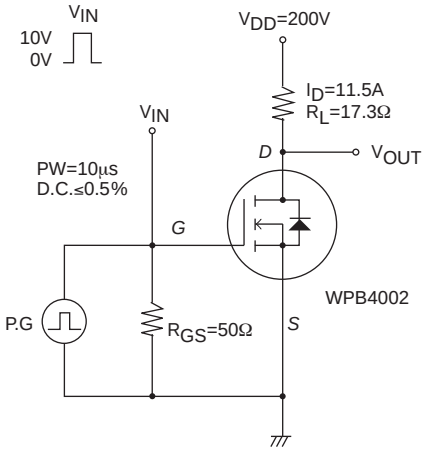
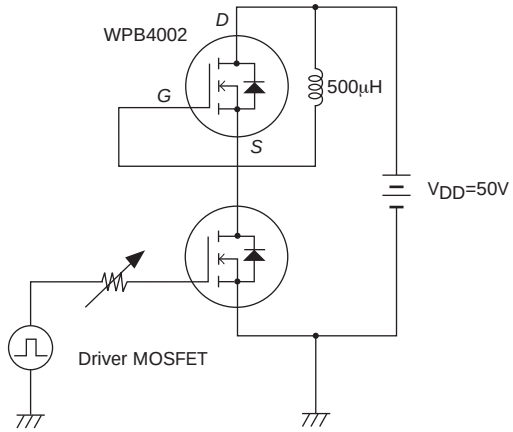
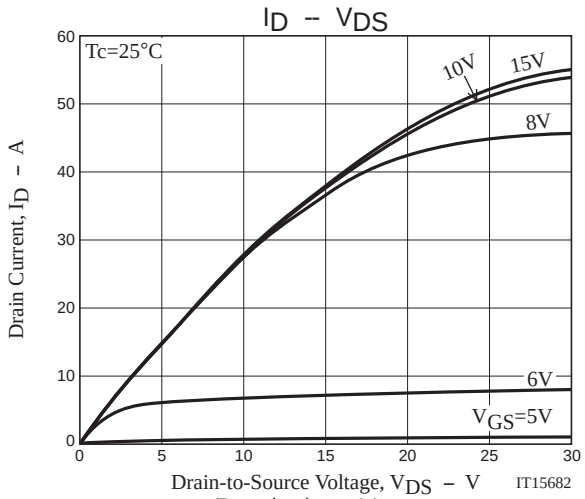
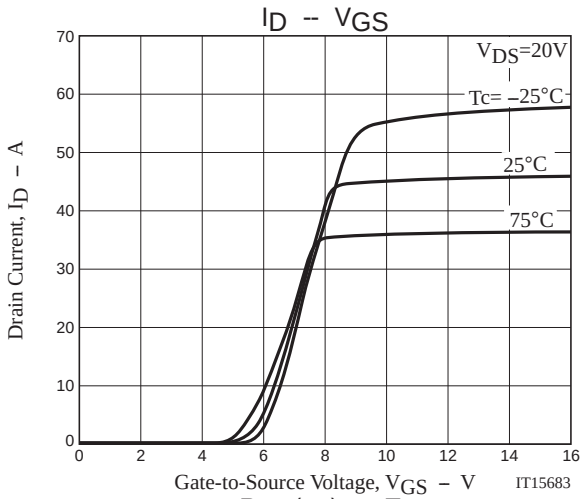
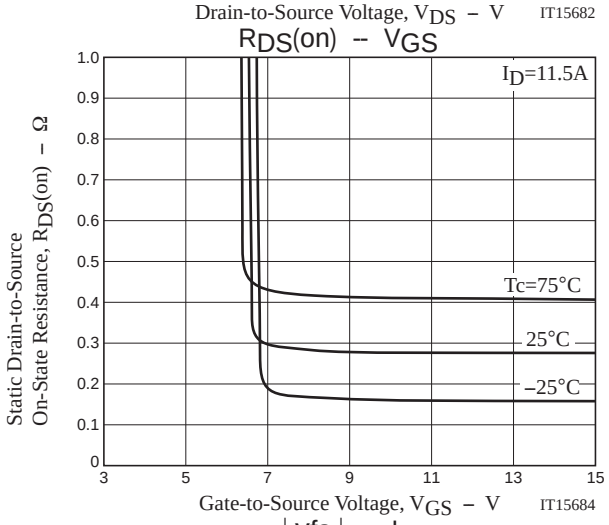


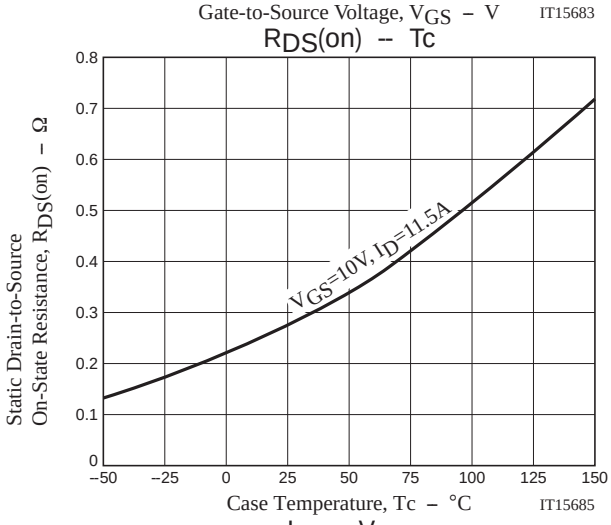
Fig.3 t_{rr} Reverse Recovery Resistance Test Circuit

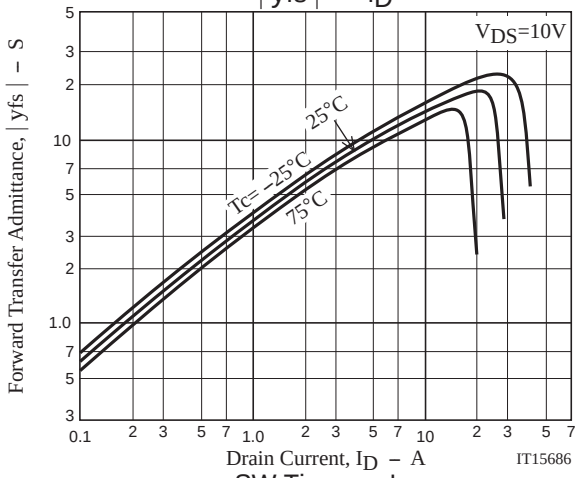


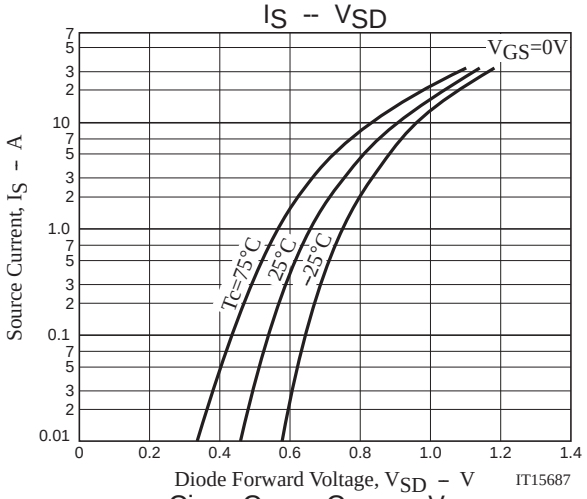

ID -- VDS
Tc=25°C
10V
15V
8V
6V
VGS=5V
Drain Current, ID – A
Drain-to-Source Voltage, VDS – V
IT15682

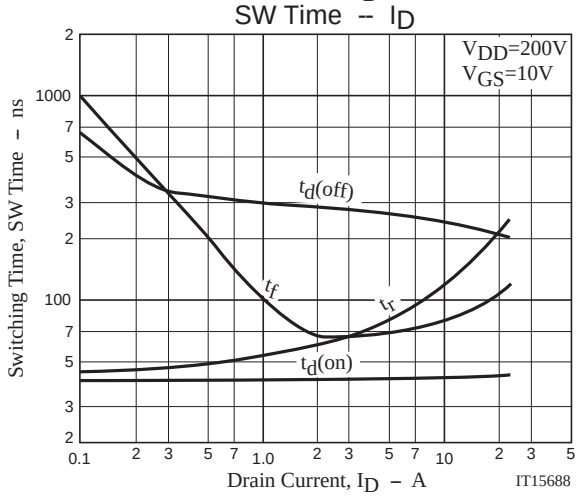

ID -- VGS
VDS=20V
Tc= –25°C
25°C
75°C
Drain Current, ID – A
Gate-to-Source Voltage, VGS – V
IT15683

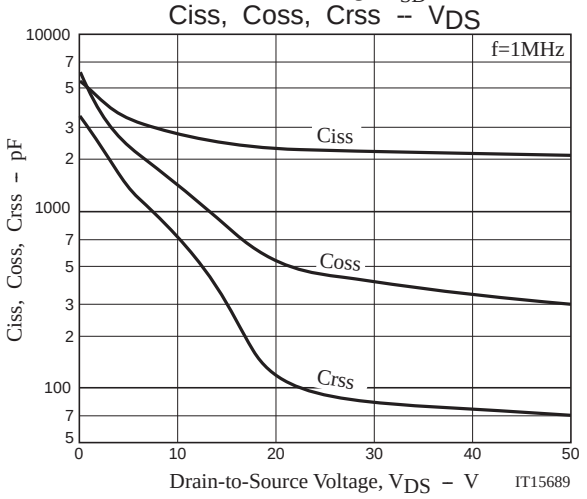

RDS(on) -- VGS
ID=11.5A
Tc=75°C
25°C
–25°C
Static Drain-to-Source On-State Resistance, RDS(on) – Ω
Gate-to-Source Voltage, VGS – V
IT15684

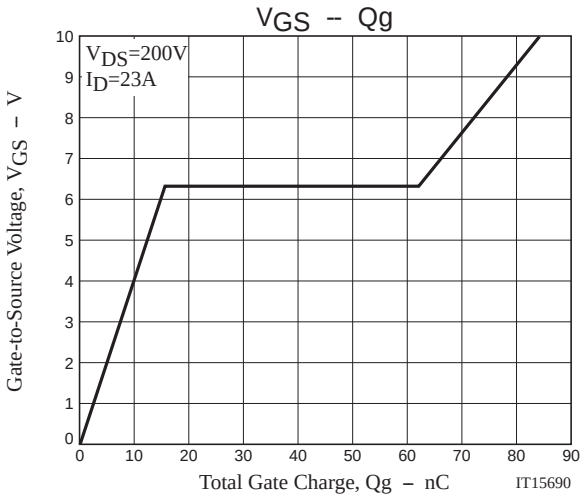

RDS(on) -- Tc
VGS=10V, ID=11.5A
Static Drain-to-Source On-State Resistance, RDS(on) – Ω
Case Temperature, Tc – °C
IT15685

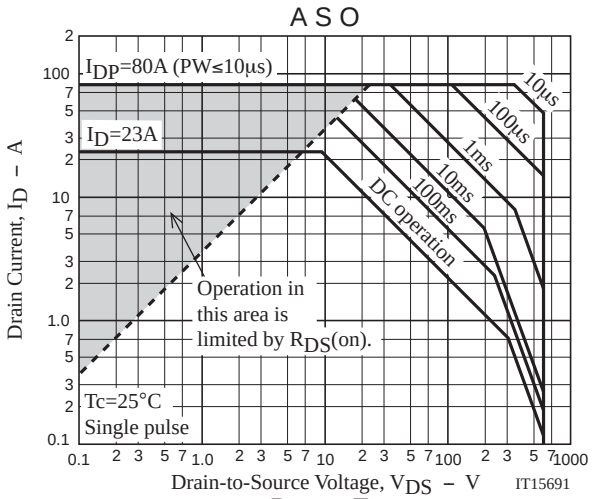

| yfs | -- ID
VDS=10V
25°C
Tc= –25°C
75°C
Forward Transfer Admittance, | yfs | – S
Drain Current, ID – A
IT15686

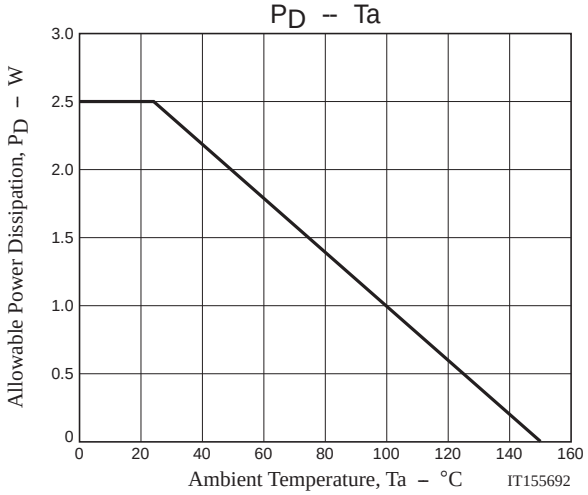

IS -- VSD
VGS=0V
Tc=75°C
25°C
–25°C
Source Current, IS – A
Diode Forward Voltage, VSD – V
IT15687

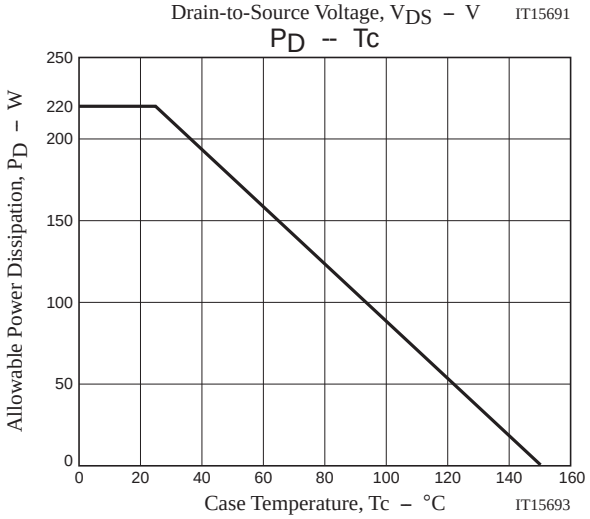

SW Time -- ID
VDD=200V
VGS=10V
td(off)
tf
tr
td(on)
Switching Time, SW Time – ns
Drain Current, ID – A
IT15688

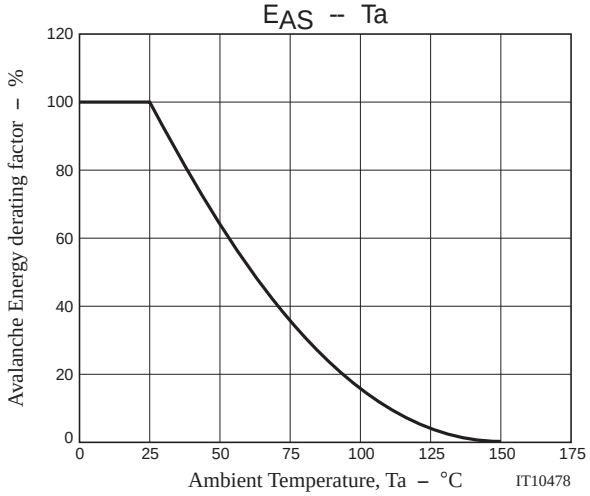

Ciss, Coss, Crss -- VDS
f=1MHz
Ciss
Coss
Crss
Ciss, Coss, Crss – pF
Drain-to-Source Voltage, VDS – V
IT15689


VGS – Qg
VDS=200V
ID=23A
Gate-to-Source Voltage, VGS – V
Total Gate Charge, Qg – nC
IT15690


A S O
IDP=80A (PW≤10μs)
ID=23A
10μs
100μs
1ms
10ms
100ms
DC operation
Operation in this area is limited by RDS(on).
Tc=25°C
Single pulse
Drain Current, ID – A
Drain-to-Source Voltage, VDS – V
IT15691


PD – Ta
Allowable Power Dissipation, PD – W
Ambient Temperature, Ta – °C
IT155692


PD – Tc
Allowable Power Dissipation, PD – W
Case Temperature, Tc – °C
IT15693


EAS – Ta
Avalanche Energy derating factor – %
Ambient Temperature, Ta – °C
IT10478

Note on usage : Since the WPB4002 is a MOSFET product, please avoid using this device in the vicinity of highly charged objects.

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